UNITED NUCLEAR
CORPORATION

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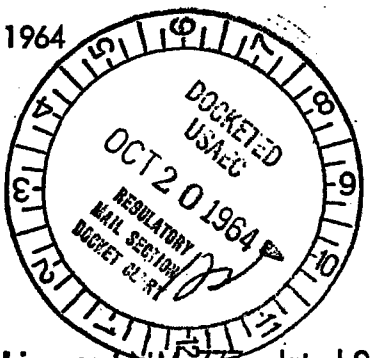
October 19, 1964



Mr. Donald A. Nussbaumer, Chief
Source and Special Nuclear Materials Branch
Division of Materials Licensing
U. S. Atomic Energy Commission
Washington, D. C. 20545

Reference: (1) Application for Amendment to License SNM-777, dated 9/15/64

(2) Your letter to Mr. John Lindberg, DML-RDS 70-820

Dear Mr. Nussbaumer:

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The following information is offered to supplement or clarify our previous submittal of September 15, 1964. Numerical references correspond with those of your letter to Mr. John Lindberg, Reference 2 above.

1. In view of the general interest expressed in the area of organization and control during our October 1st meeting, Section 200 of the General Information Manual is revised, effective October 15, 1964, replacing the September 10th submittal. The revision explains more fully the management controls, personnel relationships and responsibilities, and administrative procedures than the revision which is replaced.

2. (1) All proposed changes in existing equipment or procedures that may involve special nuclear material will be submitted to the Director of Licensing or his delegate for review and approval. Records will be kept of all approved changes including those which in the judgment of the Director of Licensing do not fall within the scope of the license and therefore require AEC approval before authorization. Generally any changes increasing the safety of the operation, such as more strict, detailed operating procedures, an increase of the safety factor as applied to mass, volume, geometry concentration limits, etc...will be approved internally. For example, should it be desired for operational reasons to replace an existing 5" diameter container already deemed safe for aqueous solutions of uranium with a smaller diameter container, this would be approved provided no changes were made in the placement or handling of this container. Should this change (in diameter) be proposed for existing process equipment, AEC review would be requested.

Liaison will be maintained with the appropriate AEC personnel to assure prompt resolution of any doubtful situation.

2 Copies provided Div. Compliance 10/20/64 JW
1 Copy provided Contracts Branch

ACKNOWLEDGED

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2. (2) In our answer to Item 1, we have included a revision to Section 200 of the General Information and Procedures Manual. Paragraph 204.4 applies.

Although the term "significant" is not used in the revision, the definition applied is as follows:

> "Any change which in the judgment of the Director of Licensing proposes a deviation from the License as issued will be submitted for review and approval by the AEC"

3. A full-time training specialist located in New Haven receives requests from the Director of Licensing and operating Supervision to prepare formal training programs for personnel of the Fuels Recovery Plant.

The objectives of the training program are:

- to insure knowledge and comprehension of the plant operating procedures;
- to highlight nuclear safety and health physics practices which are integrated into plant operating procedures;
- to assure awareness of and capability in following health physics practices;
- to maintain current knowledge of revisions in operating practices and any changes in health physics or nuclear safety practices or criteria;
- to assure readiness for execution of emergency plans and procedures.

Description of the training program and drill schedules are in the Emergency Control Plan, Section VI, dated 10/15/64.

4. Portable containers are identified by a permanent tag. For one gallon jars, the tags are 1-1/4" in diameter of stainless steel with a serial number punched into the tag. Tag for each container is secured to the neck of the one gallon jars by means of a stainless steel wire. Each stainless steel tag has a hole provided for the placement of a material identification tag.

The 11 liter bottles, 5" in diameter, are serially numbered by imprinting the numbers into a stainless steel clamp which is secured around the bottle.

A paper tag is attached to the metal tag or clamp, providing description of the bottle contents, job number, enrichment, weight or volume, etc. The paper tag is identified with the bottle permanent number.

4. (Continued)

When sampled, a sample tag accompanies the sample bearing the same serial number as the bottle tag. When the sample is returned, sample tag returns to the storage bottle. The sample tag also carries discard instructions.

All tags require operator signature when bottle is filled and tag written.

All samples and results are recorded in a "Sample Log Book". The log serial number for each sample is recorded in the book, on the bottle tag and on the sample tag.

Supervisory signature is needed for discard. After discard, operator returns both sample tag and bottle tag to supervisor and notes discard action in log book.

Move patterns within the plant are established by marked routes on the floor, with no more than one container permitted in a path at one time. The paths are sufficiently removed from process equipment to permit safe passage.

Storage of 11 liter bottles is in always safe dollies. Storage of gallon (4-liter) jars is in the permanent storage area in Bay XII, where shelves are designed for safe storage (Ref. criticality calculation section of application).

5. The equipment available for the determination of airborne radioactivity and radiation levels are:

Air Sampler (Millipore XX60-000-00 or equivalent) with Gelman 1100A, 100C or equivalent, 6 units at present) Staplex TF1A or equivalent high volume sampler.

Gas Proportional Counter (Nuclear Measurement Corp. PC-3 or equivalent)

Survey Instruments:

a. Nuclear Chicago Model 2650 BY survey meter or equivalent 0-100 mr/hr range

b. Victoreen Instrument Company BY survey meter Model 1A or equivalent.

c. Landers, Frary & Clark B survey meter Model 3 or equivalent 0-500 R/hr. range

d. Eberline gas-proportional alpha counters PAC-3G or equivalent

6. Containers used for contaminated materials (contaminated refers to material having little or no recoverable uranium values but containing radioactivity such that further processing is required before re-use or discard) and equipment are so designed that liquids are not retained in unsafe geometry by punching holes in the bottom or sides of these containers or the use of cloth bags.

   Provision for covering such containers is supplied to minimize airborne contamination.

7. Although there are no hoods now operating at positive pressure, any work to be performed in argon or helium atmosphere will be done at slight positive pressure.

8. The Emergency Control Plan has been revised in line with our discussion of October 1, 1964 and is resubmitted under revision date of October 15, 1964.

9. The use of Raschig rings is being reviewed. On an interim basis the rings will be sampled for inspection and replaced as necessary. Criteria for replacement are a loss of boron (<4% boron requires replacement) as determined by chemical analysis, or a loss of structure as determined by visual inspection.

10. In addition to the audible moisture alarm on the vacuum line, Vacuum Receiver has been charged with Raschig rings.

    Other similar situations are the cyclone of the evaporator set up which has been wrapped with cadmium sheet, and the entrainment separator which now has Raschig ring protection but which will be replaced by one of geometrically safe design.

11. Overflow and vent bottles will be placed in accordance with safe interaction criteria assuming in this instance that a 5" diameter vessel has a maximum k~~eff~~ of 0.58 and that a solid angle less than 3.2 steradions is conservatively safe. Approval of the Director of Licensing will be required for such location of such containers.

12. Storage of special nuclear material will be permitted in an emergency only when assurance is provided that the spacing provided is equal to or larger than that in normal planned storage and that containers are equal or smaller than those presently in use.

13. Supervisory signature is required prior to emptying of all solutions. In addition, hood 1-L-18 is being installed to permit washoff of all residues in safe geometry equipment.

The additional observations made in your letter will be clarified by the following statement:

The use of respirators is only a precautionary measure when it is suspected that airborne radioactivity levels may be exceeded momentarily. No allowance for use of respirators as an exception to 10CF20 has been requested.

No warping of the 11 liter plastic bottles has been observed to date with the organic materials available. However, a "go" gauge is provided for routine checking against any distortion of the bottles.

We hope the above will provide the information requested. If there are further questions or comments, please let me know.

Very truly yours,

D. F. Cronin

D. F. Cronin
Director of Licenses

DFC/kb

200. GENERAL INFORMATION

201. Corporate

The United Nuclear Corporation, a Delaware corporation, maintains headquarters offices at Centreville, Maryland. The company is engaged in the mining and milling of uranium ores, processing and fabrication of reactor fuels and components, and the design and development of nuclear reactors.

A listing of principal officers, locations of the operating divisions, and financial qualifications of the firm may be found in the annual report. (A copy of the 1964 Annual Report is attached.)

The Fuels Recovery Plant is operated by Fuels Division, which has administrative offices at 365 Winchester Avenue, New Haven, Connecticut.

202. Location and Facilities

The Fuels Recovery Plant is located on a 1200 acre site in a sparsely populated area of Southwestern Rhode Island. The plant is approximately one mile southeast of Wood River Junction.

The general arrangement of the plant is shown on drawings A-601, A-602, A-603 and Y-601.

The plant consists of a single principal building with office, locker-room, general utilities and maintenance facilities to the front (West End) and storage and processing facilities at the back (East End)., A small laboratory is located at the second level above the locker-room area.

A paved yard is used for outside storage. A lagoon with waste discharge control facilities is located within the fenced area and just north of the building.

The building consists of the following areas (defined by bays):

Bays	Description of Operations
(For Bay designations see Drawing Y-601)	Uranium Process Areas
VII, VIII	Shipping & Receiving Area
XIII, XIV, XVI, XVII, XIX	Head Ends Processing Area
XX (3 floors)	Purification Processing Area

202. (continued)

Bays	Description of Operations
(For bay designations see Drawing Y-601)	Uranium Process Areas
XV, XVIII, XXI	End Product Processing Area
XII	Product Storage Area
IV (Second Floor)	Control Laboratory
	Non-Uranium Areas
XI	Storage Area
IX	Maintenance
V, VI	Utility Area
I, II, III, IV (First Floor)	Main Entrance, General Plant Office, Lunch Room, Clothes-Change Locker - Change Room

Outside storage areas are the paved areas north of the plant, within the fenced area. These areas are used for storage of uranium materials as received in protective spacing birdcages and drums.

Empty shipping containers are so identified and stored outside prior to return to the owner.

203. Summary of Activities and Description of Material

Special nuclear materials will be received, handled, used and stored at the plant for:

1. Further processing as requested by authorized customers.
2. Shipment to others licensed by the Atomic Energy Commission.
3. Analytical testing and development.
4. Research and development.

203. (continued)

Uranium will be handled in the form of metal and alloys, compounds and solutions. The U-235 isotopic content of the uranium will be up to and including fully enriched.

Unless specifically stated otherwise, the material has a maximum density of 3.2 grams uranium per cc and generally conforms to the density versus H/U-235 ratio for which the data of Figures 1, 2, 3, and 4 in TID-7016, Revision 1 is directly applicable. TID-7028, dated June 1964 supplements TID-7016.

The types of scrap for which the facility was designed include:

U-Zr alloys as chips (6 - 20% U content); pickle liquors of U-Zr (less than 5 grams/liter)

U-Al alloys (5 to 60% U content)

UO_2-ZrO_2 (70 to 80% U content)

UO_2-ZrO_2 - Coated (50 to 60% U content)

Combustibles as carbonaceous materials

The estimated annual throughput is 1000 to 2000 kgs U-235. The maximum quantity of special nuclear material on hand at any one time will be 2000 kgs.

In addition to recovery operations at the site, fuel elements may be sent to other licensed facilities in New Haven for disassembly and removal of non-fuel bearing material prior to recovery, and samples for analysis will be sent to our New Haven or to other qualified laboratories.

Both licensed and non-licensed materials may be processed, but all provisions for nuclear safety and health physics required by license will be applied uniformly to all materials processed.

Although licensed and non-licensed materials may be processed concurrently in the same areas, separate identity will be maintained by means of distinctive tags for the two categories of material.

204. Plans to Assure License Compliance

204.1 Organization

The Fuels Recovery Plant is operated as part of Fuels Division, which also includes plants in New Haven and Montville,

204.1 (continued)

Connecticut and Hematite, Missouri. Because of their similar technologies, the Hematite and Wood River Junction plants are combined for administrative purposes into a Chemicals Operation headed by a manager reporting to the Division Vice-President. Various staff services are provided all of the plants from division headquarters at New Haven.

The organizational concept for the Fuels Recovery Plant has these objectives:

1. Provision of on-site process, nuclear safety, and health physics control functions which are independent of the production function.

2. Assurance of adequate technological support for the plant.

3. Provision for nuclear safety, health physics, and feasibility review of all process and equipment modifications.

4. Duplication of channels for reporting irregularities and abnormalities to higher management.

5. Systematic auditing of plant operations.

The organization chart is shown on the following page.

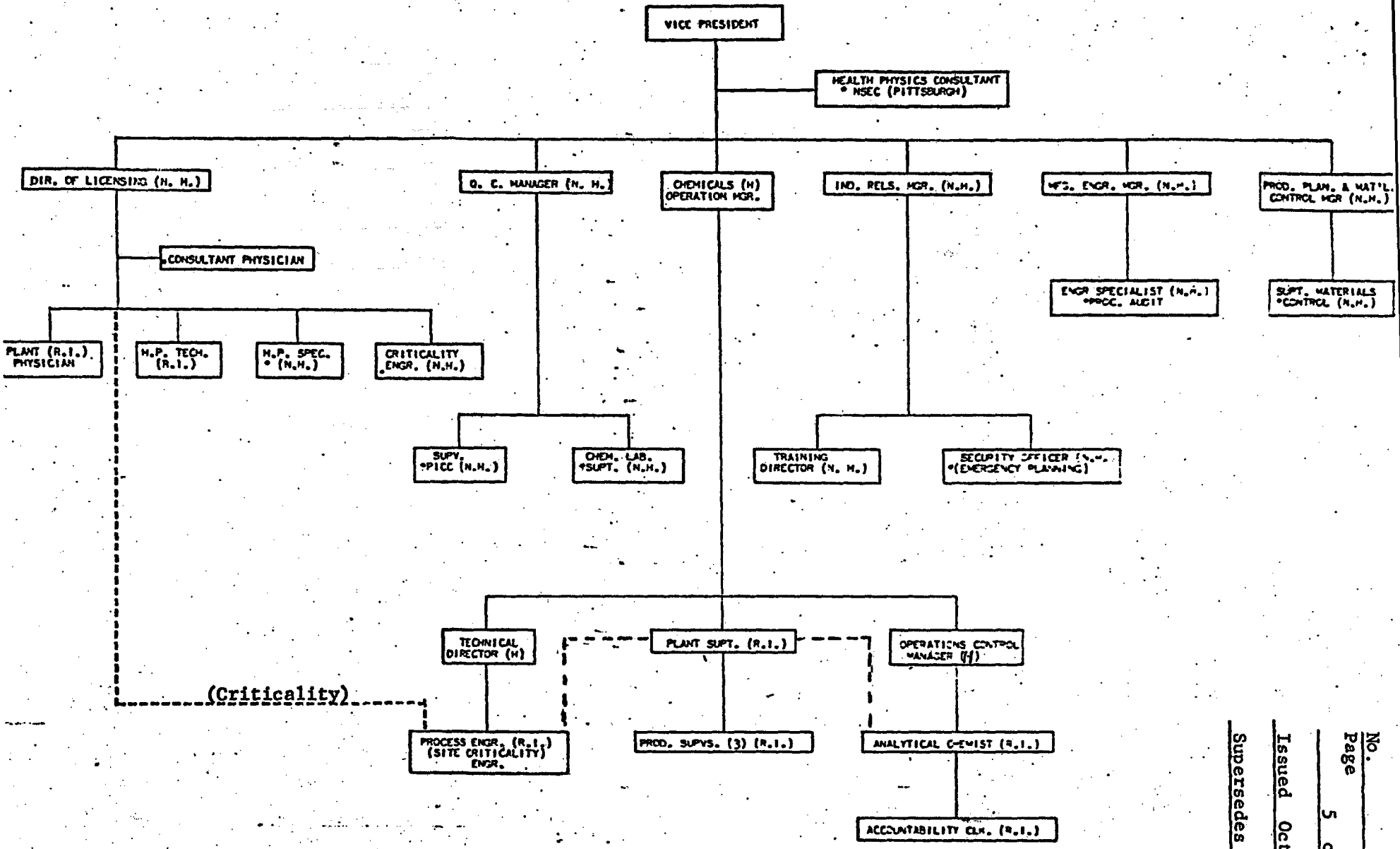
204.2 Assignments of Responsibility

Individual responsibilities are defined in each employee's position analysis. Basic responsibilities, with regard to the Fuels Recovery Plant, are these:

a. The Vice-President, Fuels Division, has general overall responsibility for the Fuels Recovery Plant.

b. The Chemicals Operation Manager is responsible for general plant administration and process development.

c. The Plant Superintendent is responsible for the safe, efficient operation and maintenance of the plant in conformance with established policies and procedures.



*AUDIT RESPONSIBILITY

204.2 (continued)

d. The Director of Licensing is responsible for the adequacy of on-site nuclear safety and health physics controls and the review of equipment and procedure modifications for continued control.

e. The Process Engineer is responsible for development of recovery processes, process procedure controls, equipment design, and on-site nuclear safety audit. In the latter regard, he reports to the Director of Licensing.

f. The Health Physics Technician is responsible for measurement of contamination levels as prescribed by the Health Physics Manual and the institution of such controls as the Director of Licensing may require.

g. The Plant Chemist is responsible for control analyses, product certifications, and accountability.

h. The Plant Supervisors are responsible for safe, efficient operation of the plant and supervision of the operators on their respective shifts.

Authority to suspend operations in event of process failure, or nuclear safety or health physics hazard, is placed with line supervision. Within the areas of their respective responsibilities, the staff members listed above also have authority to suspend operations.

Additional division staff members, as shown on the organization chart, exercise assistance and audit responsibilities in their respective areas.

204.3 Technical Qualifications of Personnel

A minimum educational requirement of a Bachelor's Degree, or equivalent in Chemistry or Chemical Engineering is specified for the Plant Superintendent, Supervisors, Chemist and Process Engineer.

Several years' work experience in scrap recovery operations are additional requirements for the Plant Superintendent and Process Engineer. Similar experience is a normal requirement for shift supervisors.

Requirements for Plant Chemist are a Bachelor of Science in Chemistry or equivalent and several years' work experience in a laboratory

204.3 (continued)

Minimum requirements for Health Physics Technician are a high school diploma with specific additional training in health physics criteria, use and maintenance of instruments, dosimeters, and other equipment, and interpretation of data.

Requirements for Director of Licensing include a broad background in nuclear safety and health physics. This position is occupied by Mr. D. F. Cronin, whose qualifications are:

a) A. B. [ ] and M. S. in Chemistry 1947, West Virginia University, Morgantown, West Virginia. Ex.6

b) Special training while employed at the Oak Ridge National Laboratory in Reactor Analysis, Radio Chemistry, Health Physics, and Reactor Technology as in plant courses, including course work in higher mathematics at the University of Tennessee. (1947 -1961)

c) Experience:

1) Oak Ridge National Laboratory, 1947 - 1961
Research chemist employed in generation of criticality data for varying enrichments and compositions of uranium.

2) Feed Materials Production Center (Fernald) 1961 - 1964
Chief of Nuclear Safety, responsible for establishment of criteria for nuclear safety, instruction of personnel in safe practices, review of procedure and equipment changes, and nuclear safety audit.

3) United Nuclear Corporation, 1964 - Present
Director of Licensing, Fuels Division, responsible for establishment of nuclear safety and health physics criteria, training, changes, AEC licensing, and internal auditing of these areas.

204.3 (continued)

In addition to the above personnel with direct responsibilities at the Fuels Recovery Plant, a large staff of technical, nuclear safety, and health physics personnel within the Fuels and Development Divisions are available for consultation or emergency assistance.

Operators are selected on the basis of aptitude testing and interviews. The normal basic educational requirement is a high school diploma. New employees receive specific training in nuclear safety and health physics, operating procedures, and operation of plant equipment. Each operator receives his own copy of standard operating procedures and is tested on his knowledge of their content. Follow-up safety meetings are held at least monthly, with records kept of material presented.

204.4 Process Control

Control of the process is maintained through a system of standard procedures and parameters, operating reports, and provisions for reporting and correcting abnormal occurrences. The principal control documents are these:

a) Standard Operating Procedures, issued by the Process Engineer, provide detailed instructions for equipment operation and material handling. SOP's are the basic control document; before issuance or revision they require engineering, production, nuclear safety, and health physics concurrence by signature. All copies are controlled.

b) Process Parameter Sheets, issued by Process Engineer, establish and communicate detailed parameters for each job, within limits established by SOP.

c) Operating Reports, designed by engineer and filled in by operator, provide a record of process conformance.

d) Check Lists, designed by engineer and filled in by operator, demonstrate steady-state operation of continuous (versus batch) equipment.

e) Rework Material Notice, issued by operator, reports abnormal plant operating conditions or generation of residues at time of occurrence.

204.4 (continued)

f) Route Cards, prepared by engineer and issued by supervisor, provide rework instructions and control over deviating material in plant, within limits established by SOP.

g) Supervisors' Log Book, provides a permanent written record of plant status with regular review by plant superintendent.

h) Daily Production Report, issued by shift supervision, summarizes daily production and outstanding rework to permit production planning and control.

204.5 Criticality Control

On-site criticality control is exercised by plant supervision under the surveillance of the process engineer. It is the policy of the company to administer stern disciplinary action for violation of nuclear safety procedures.

Definition of control limits, approval of equipment installation or modifications, and approval of process procedure changes is exercised by the Director of Licensing, unless specifically delegated to a qualified nuclear safety engineer. The Director is also responsible for determination of the need for license amendment and obtaining requisite AEC approvals.

The general criticality control procedures follow the recommendations included in such recognized publications as:

TID-7016, Rev. 1 - "Nuclear Safety Guide"
K-1019, 5th Rev. - "Basic Critical Mass Information and Its Application to Oak Ridge Gaseous Diffusion Plant Design and Operation"
TID-7019 - "Guide to Shipment of U-235 Enriched Uranium Materials"

The primary criticality control procedures are based on the assumption of optimum water moderation and full water reflection of individual units. This is then applied to determine the safe mass, safe geometry and safe volume of the material and enrichment in process. In some specific cases, the nuclear

205.5 (continued)

safety of a piece of equipment or a process is evaluated on the basis of actual critical data or calculations based on such data. In any event, each process, equipment item or storage area in which enriched uranium is handled must be approved by the AEC Division of Licensing and Regulation (as required by 10 CFR, Part 70). Many of the processes and equipment items for which license approval is herein requested are duplicates of or essentially similar to those already licensed and used at our Hematite operations. Thus, general reference is made to our file under SNM-33, and in particular to information contained in our application for license renewal of July 15, 1963.

Unless otherwise stated the following tabulated multiplication factors will be used to evaluate equipment interaction. Also the following solid angles are used to determine safe interaction.

Individual Safe Feature	Multiplication Factor, K	Safe Solid Angle, Steradians
5" diameter	0.58	3.2
Safe mass	0.65	2.5
Safe volume	0.71	1.9
Safe geometry	0.80	1.0

Positive identification of material in bottles is maintained by permanent stainless steel bottle identification plates, a serialized tag which describes contents, date and by whom filled, and a sample analysis tag which accompanies the sample and reports concentration and total quantity of uranium. Tags are cross referenced and results recorded in sample log book. A check sign-off by the supervisor is required before any discard material may be removed from safe geometry, safe volume, or poisoned vessels into unsafe geometry.

204.6 Audit

Systematic auditing of the Fuels Recovery Plant by outside personnel is performed in, but not limited to, the following areas:

204.6 (continued)

Area	BY	Minimum Frequency
Health Physics	Director of Licensing or Health Physics Specialist	1 month
Nuclear Safety	Director of Licensing or Nuclear Safety Engineer	2 months
Procedures and Records Control	Supervisor, Process Information Center	3 months
Accountability	Superintendent, Materials Control or designee	6 months

Records of visits are maintained and evidence of unsatisfactory findings reported in writing to plant level and higher management for corrective action.